Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (original) A process for producing photoluminescent silicon nanoparticles comprising:

reacting a silicon precursor in the presence of a sheath gas with heat from a radiation beam under conditions effective to produce silicon nanoparticles and

acid etching the silicon nanoparticles under conditions effective to produce photoluminescent silicon nanoparticles.

2. (original) The process as claimed in claim 1, wherein the silicon precursor comprises a silane.

3. (original) The process as claimed in claim 2, wherein the silane is SiH_4.

4. (original) The process as claimed in claim 1, wherein the sheath gas comprises hydrogen.

5. (original) The process as claimed in claim 4, wherein the sheath gas further comprises helium, argon, nitrogen, or a mixture thereof.

6. (original) The process as claimed in claim 1, wherein the radiation beam is produced by a laser.

7. (original) The process as claimed in claim 6, wherein the laser is a CO_2 laser.

8. (original) The process as claimed in claim 1, wherein said reacting is carried out in the presence of a photosensitizer.

9. (original) The process as claimed in claim 8, wherein the photosensitizer comprises sulfur hexafluoride or silicon tetrafluoride.

10. (original) The process as claimed in claim 1 further comprising:

collecting the silicon nanoparticles on a filter after said reacting and before said acid etching.

11. (original) The process as claimed in claim 10, wherein the filter is a cellulose nitrate membrane filter.

12. (original) The process as claimed in claim 1, wherein the silicon nanoparticles have an average diameter less than about 20 nm.

13. (original) The process as claimed in claim 12, wherein the silicon nanoparticles have an average diameter from about 5 nm to 20 nm.

14. (original) The process as claimed in claim 1, wherein said acid etching is carried out with a solution comprising hydrofluoric acid and nitric acid.

15. (original) The process as claimed in claim 14, wherein the solution comprises about 0.5% to 20% hydrofluoric acid and about 10% to 40% nitric acid.

16. (original) The process as claimed in claim 15, wherein the solution comprises about 3% hydrofluoric acid and about 32% nitric acid.

17. (original) The process as claimed in claim 1, wherein the silicon nanoparticles are dispersed in a solvent prior to acid etching.

18. (original) The process as claimed in claim 17, wherein the solvent is selected from the group consisting of water, methanol, or isopropanol.

19. (original) The process as claimed in claim 18, wherein the solvent is methanol.

20. (original) The process as claimed in claim 1 further comprising:

collecting the photoluminescent silicon nanoparticles on a filter after said acid etching.

21. (original) The process as claimed in claim 20 further comprising:

washing the photoluminescent silicon nanoparticles after said collecting.

22. (original) The process as claimed in claim 1 further comprising:

treating the photoluminescent silicon nanoparticles with an oxidizer.

23. (original) The process as claimed in claim 22, wherein the oxidizer is a nitric acid solution.

24. (original) The process as claimed in claim 23, wherein the oxidizer is an about 20% to 40% nitric acid solution.

25. (previously presented) The process as claimed in claim 24, wherein the oxidizer is a 30% nitric acid solution.

26. (original) The process as claimed in claim 1 further comprising:

isolating the photoluminescent silicon nanoparticles having peak emission in the orange or red spectral region and

treating the isolated photoluminescent silicon nanoparticles under conditions effective to induce rapid thermal surface oxidation of the particle surface.

27. (original) A process for producing photoluminescent silicon nanoparticles comprising:

thermally decomposing a silicon precursor in the presence of a sheath gas with CO_2 laser radiation under conditions effective to produce silicon nanoparticles and

acid etching the silicon nanoparticles with a hydrofluoric acid and nitric acid solution under conditions effective to produce photoluminescent silicon nanoparticles.

28. (currently amended) A process for altering photoluminescence of free silicon nanoparticles comprising:

acid etching the free silicon nanoparticles under conditions effective to produce photoluminescent free silicon nanoparticles.

29. (original) The process as claimed in claim 28, wherein said acid etching is carried out with a hydrofluoric acid and nitric acid solution.

30. (original) The process as claimed in claim 29, wherein the solution comprises about 0.5% to 20% hydrofluoric acid and about 10% to 40% nitric acid.

31. (currently amended) A process for stabilizing photoluminescence of free silicon nanoparticles comprising:

treating the photoluminescent free silicon nanoparticles with an oxidizer under conditions effective to achieve particle surface oxidation.

32. (original) The process as claimed in claim 31, wherein the oxidizer comprises a nitric acid solution.

33. (original) The process as claimed in claim 32, wherein the oxidizer is an about 20% to 40% nitric acid solution.

34. (original) The process as claimed in claim 33, wherein the oxidizer is a 30% nitric acid solution.

35. (previously presented) A process for stabilizing photoluminescence of silicon nanoparticles comprising:

treating photoluminescent silicon nanoparticles under conditions effective to produce photoluminescent silicon nanoparticles having a Si-H terminated surface; and

treating the Si-H surface-terminated nanoparticles under conditions effective to achieve particle surface hydrosilylation.

36. (previously presented) A process for stabilizing photoluminescence of silicon nanoparticles comprising:

treating photoluminescent silicon nanoparticles under conditions effective to produce photoluminescent silicon nanoparticles having a Si-OH terminated surface; and

treating the Si-OH surface-terminated nanoparticles under conditions effective to achieve particle surface silanization.